What is claimed is:

1. An isolated, pure population of mammalian CNS neuroepithelial stem cells wherein said cells are capable of self-renewal in adherent feeder-cell-independent culture medium and of differentiation to CNS neuronal or glial cells.

2. The population of claim 1 wherein said neuroepithelial stem cells express nestin, but do not express polysialated neural cell adhesion molecule, glial fibrillary acidic protein, sulfatide, neurofilament, choline acetyl transferase, intermediate filament, ganglioside, or galactocerebroside.

3. The population of claim 1 wherein said CNS neuronal cells express intermediate filament and neurofilament 68.

4. The population of claim 3 wherein said CNS neuronal cells express choline acetyl transferase.

5. The population of claim 1 wherein said CNS glial cells express glial fibrillary acidic protein.

6. The population of claim 5 wherein said CNS glial cells express ganglioside.

7. The population of claim 1 wherein said CNS glial cells express ganglioside.

8. The population of claim 7 wherein said CNS glial cells express sulfatide.

9. The population of claim 7 wherein said CNS glial cells express galactocerebroside.

10. The population of claim 1 wherein said neuroepithelial stem cells are further capable of differentiation to glial-restricted precursor cells.

11. The population of claim 10 wherein said glial-restricted precursor cells are capable of self-renewal in adherent feeder-cell-independent culture medium and capable of differentiation to CNS glial cells but not to CNS neuronal cells.

12. The population of claim 11 wherein said glial-restricted precursor cells express nestin and ganglioside, but

do not express glial fibrillary acidic protein, sulfatide, or galactocerebroside.

13. The population of claim 11 wherein said CNS glial cells express ganglioside and glial fibrillary acidic protein.

14. The population of claim 11 wherein said CNS glial cells express glial fibrillary acidic protein but do not express ganglioside.

15. The population of claim 11 wherein said CNS glial cells express galactocerebroside but do not express ganglioside.

16. An isolated, pure population of mammalian CNS glial-restricted precursor cells, wherein said glial-restricted precursor cells are capable of self-renewal in adherent feeder-cell-independent culture medium and capable of differentiation to CNS glial cells but not to CNS neuronal cells.

17. The population of claim 16 wherein said glial-restricted precursor cells express nestin and ganglioside, but

do not express glial fibrillary acidic protein, sulfatide, or galactocerebroside.

18. The population of claim 16 wherein said CNS glial cells express ganglioside and glial fibrillary acidic protein.

19. The population of claim 16 wherein said CNS glial cells express glial fibrillary acidic protein but do not express ganglioside.

20. The population of claim 16 wherein said CNS glial cells express galactocerebroside but do not express ganglioside.

21. A method of isolating a pure population of mammalian CNS neuroepithelial stem cells wherein said cells are capable of self-renewal in feeder-cell-independent adherent culture medium and of differentiation to CNS neuronal or glial cells, comprising the steps of:

(a) removing a neural tube from a mammalian embryo at a stage of embryonic development after closure of the neural tube but prior to differentiation of cells in the neural tube;

(b) dissociating cells comprising the neural tube removed from the mammalian embryo;

(c) plating the dissociated cells in feeder-cell-independent culture on a substratum and in a medium configured for supporting adherent growth of the neuroepithelial stem cells comprising effective amounts of fibroblast growth factor and chick embryo extract; and

(d) incubating the plated cells at a temperature and in an atmosphere conducive to growth of the neuroepithelial stem cells.

22. The method of claim 21 wherein said mammalian embryo is selected from the group consisting of primates, equines, canines, felines, bovines, porcines, ovines, and lagomorphs.

23. The method of claim 21 wherein said substratum comprises fibronectin.

24. The method of claim 21 wherein temperature is about 37°C and said atmosphere comprises about 5% CO_2 and about 95% air.

25. The method of claim 21 wherein said medium comprises NEP medium.

26. A method of isolating a pure population of mammalian CNS glial-restricted precursor cells wherein said cells are capable of self-renewal in adherent feeder-cell-independent culture medium and of differentiation to CNS glial cells but not CNS neuronal cells, comprising the steps of:

(a) isolating a population of mammalian CNS neuroepithelial stems cells;

(b) incubating the neuroepithelial stem cells in a medium lacking an effective amount of chick embryo extract for a period of time sufficient for the cells to begin differentiating;

(c) subjecting the incubated cells to specific antibody capture using an antibody characteristic of glial-restricted precursor cells to result in a captured subpopulation of cells; and

(d) incubating the captured subpopulation of cells in a medium configured for supporting adherent growth thereof comprising effective amounts of fibroblast growth factor and platelet derived growth factor.

27. The method of claim 26 wherein said isolating a population of CNS neuroepithelial stem cells comprises:

(1) removing a neural tube from a mammalian embryo at a stage of embryonic development after closure of the neural tube but prior to differentiation of cells in the neural tube;

(2) dissociating cells comprising the neural tube removed from the mammalian embryo;

(3) plating the dissociated cells in feeder-cell-independent culture on a substratum and in a medium configured for supporting adherent growth of the neuroepithelial stem cells comprising effective amounts of fibroblast growth factor and chick embryo extract; and

(4) incubating the plated cells at a temperature and in an atmosphere conducive to growth of the neuroepithelial stem cells.

28. The method of claim 27 wherein said mammalian embryo is selected from the group consisting of primates, equines, canines, felines, bovines, porcines, ovines, and lagomorphs.

29. The method of claim 27 wherein said substratum comprises fibronectin.

30. The method of claim 27 wherein temperature is about 37°C and said atmosphere comprises about 5% CO_2 and about 95% air.

31. A method of generating a population of mammalian motoneurons comprising the steps of:

(a) isolating a population of mammalian CNS neuroepithelial stems cells; and

(b) incubating the neuroepithelial stem cells in a medium that promotes cell proliferation and neuronal differentiation for a period of time sufficient for the cells to begin differentiating.

32. The method of claim 31 wherein the medium comprises laminin-coated plates and NEP medium lacking an effective amount of chick embryo extract.